water containing a number of these larvæ to rest on his hand. In a few minutes, a slight irritation set in which attracted his attention, but on examining his hand under a lens he found that the larvæ had disappeared. His conviction that they had forced their way through the skin into the subcutaneous tissues was confirmed at a later date, when he discovered that his intestine contained the ova of the parasite and that he had thus infected himself with ankylostomiasis. At the time, many persons were inclined to doubt his explanation of the occurrence, but he has since then made experiments with dogs and human beings, and in each case has been able to prove that the larvæ, entering the body by the skin, have worked their way into the intestine.

His study of the Bilharzia parasite has not yet reached the same stage of advancement, but although he cannot at present demonstrate the fact, he is convinced that the mode of infection is by the skin, as in the case of ankylostomum, and not by the mouth, as has been supposed. The negative evidence in support of this theory is that if the larvæ of Bilharzia are brought even momentarily into contact with weak solutions containing acids they are at once killed, and this fact renders it impossible for them to pass the stomach if they are taken by the mouth. Positive evidence is still wanting, owing to the great danger involved.

Prof. Looss has not felt justified in making experiments on human beings until a more perfect knowledge of the larvæ is attained, and it is difficult to find animals with a skin resembling that of human beings for the purposes of experiment. But from some partial successes he has had, he considers it only a matter of time before his contention will be established, namely, that healthy persons can become infected with bilharzia merely by dipping a hand or foot into water containing larvæ. When we consider how much of their time the natives spend in wading in the Nile and in the canals, the water of which contains these parasites, we are at last within measurable distance of accounting for the extraordinary prevalence of the disease among them.

THE VACCINATION ACTS.

THERE seems good reason to hope that the legal obligation of parents to procure the primary vaccination of their children in infancy will be extended in the ensuing session of Parliament so as to include revaccination at about twelve years of age. The widely representative and weighty deputation of the Imperial Vaccination League which interviewed the President of the Local Government Board last week made out a strong case for this and other amendments of the present law as to vaccination, and they had a most sympathetic reception from Mr. Long. He, of course, spoke only for himself, and not for the Government as a whole, but being the head of the Board which has charge of the subject, and having evidently given it most careful consideration and arrived at pretty definite conclusions as to the main points requiring attention in a new Act, there seems every reasonable prospect that these conclusions will be found embodied in a Bill and submitted to Parliament in time for enactment before the session ends. It must be recollected that the question comes up this session in any case. The Act of 1898, which introduced domiciliary vaccination and the Conscience Clause, is only a temporary measure, ceasing to have effect after the end of the present year. There is no chance of its being allowed to drop so as to cause reversion to the old system, and very little chance of its simply being included in the Expiring Laws Continuance Bill. When they are at it, therefore, it is important that Government should deal with the matter with some degree of finality. The five years' experiment has been most useful in furnishing experience of the strong and weak points of the present law, so that the whole subject is ripe for legislative treatment. The aim should be to achieve, as nearly as possible, German results by English methods, and the chief points requiring attention are obligatory revaccination, the supply of glycerinated calf lymph, the adoption of a standard of efficiency of vaccination, and the transference of the administration of the Vaccination Acts from Boards of Guardians to public bodies better adapted for the work.

REV. DR. H. W. WATSON, F.R.S.

THE death, on January 11, of the Rev. H. W. Watson, Sc.D., F.R.S., has removed from the scientific world a worker who did much to elucidate one of the most difficult applications of mathematical reasoning to molecular science.

Henry William Watson was born in London in February, 1827, being the son of the late Thomas Watson, of the Royal Navy. At the age of nineteen, he gained the first mathematical scholarship at King's College, London, and two years later obtained a scholarship at Trinity College, Cambridge, where he graduated in 1850 as second wrangler and Smith's prizeman, Dr. Besant being senior wrangler. In 1851, he was elected fellow and assistant tutor of Trinity College, Cambridge, but on his marriage he was compelled by the then existing statutes to seek a livelihood elsewhere, and accordingly he obtained a mathematical mastership at the City of London School in 1854, and was appointed mathematical lecturer at King's College, London, in 1856 and assistant master at Harrow School in 1857. His work as a teacher ended after his appointment to the rectory of Berkeswell, near Coventry, where he resided until within a short time of his death. He was elected Fellow of the Royal Society in 1881.

A considerable proportion of Dr. Watson's published work was written with the collaboration of Mr. S. H. Burbury, F.R.S. Among these joint writings, we notice the treatise on generalised coordinates applied to the kinetics of a material system, published in 1879, the article "Molecule" in the ninth edition of the "Encyclopædia Britannica" and the treatise on the mathematical theory of electricity and magnetism, of which the first volume ("Electrostatics") appeared in 1885 and the second in 1889. The appearance of the latter volume occurred at a somewhat critical period in the history of electromagnetism. It was Dr. Watson's hope to clear up many of the obscure points in the deductive reasoning on which Maxwell's theory of electromagnetism was based. The same task had been undertaken about the same time in Germany by Hertz, who had, however, sought to substantiate the theory on experimental grounds, and his demonstrations of electric oscillations, followed up by the work of Fitzgerald and Lodge, diverted attention from the mathematical treatment of the subject. Dr. Watson, on the other hand, found in the course of the work that many points in Maxwell's theory could not be established by deductive reasoning alone, but he has given remarkably elegant treatments of many of the problems in which this difficulty does not occur.

The books written by Dr. Watson alone include a treatise on geometry in Longmans' Text-books of Science Series (1871), but his best-known work was the collection of propositions on the kinetic theory of gases, which for many years served as a text-book on this subject. While the second edition of 1894 was still in preparation, a controversy arose as to the validity of the Boltzmann-Maxwell law, and an apparent exception had been suggested in the case of a system of lop-sided spheres. Dr. Watson, by his investigation of the corresponding problem for circular

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discs, did much to elucidate the error in the investigation in question, and to establish the result that if the distribution of coordinates and momenta, which Gibbs now calls "canonical," exists at any instant, it will exist at all future instants. He also gave considerable attention to Boltzmann's minimum theorem, putting the proof into an elegant form.

The theory of errors was a favourite study of Dr. Watson's, and in February, 1891, he read an address before the Birmingham Philosophical Society on the subject. About the year 1894, he was appointed examiner in mathematics in the University of London, but before his term of office had expired, he was compelled to resign owing to a slight paralytic stroke. Recently, owing to ill health, he gave up the rectory of Berkeswell, and migrated to Brighton not long before his death.

Dr. Watson was a representative of the old school of physicists who relied on mathematical reasoning alone, an extreme which would at the present day be as far on one side of the happy mean as the modern experimentalist who builds up mere tables of numerical results is on the other. But his chief work was done at a time when "natural philosophy" meant applied mathematics and not experimental electricity. He was a valued friend to whom the present writer has on more than one occasion been deeply indebted for help and assistance in difficulties.

G. H. BRYAN

DR. H. E. SCHUNCK, F.R.S.

BY the death of Dr. Edward Schunck, the world has suffered the loss of one of that small band of men of fortune who have devoted themselves to the study of science for its own sake. Edward Schunck was born in Manchester on August 16, 1820, to which town his father, Martin Schunck, had a short time previously removed from Malta to found the business of Schunck, Mylius and Co. This, which was one of the first firms of export merchants started in Lancashire, afterwards became Schunck, Souchay and Co., and as business increased they acquired a dye works in Rochdale. As Martin Schunck was anxious that his son should eventually undertake the management of this works, he sent him to study chemistry under Liebig at Giessen, and at Berlin under Rose and Magnus, but eventually, after some years' trial, the son found that he did not care for the business, and decided to devote himself entirely to research work.

Schunck must, without doubt, be considered the most celebrated worker upon the natural colouring matters, for among these substances there is hardly one to which he has not contributed some fact of considerable importance. His elaborate investigation of madder, commenced in the 'forties and continued to 1894, constitutes an excellent example of the energy and patience which characterised him throughout the whole of his career. With our opportunities of to-day, it is not easy to appreciate fully the labour entailed by his early work in this direction, and though he was most anxious for some younger man to complete his investigation of the yellow substances contained in this plant, no one has yet attempted to face the difficulties of this subject.

It is not possible in this short notice to attempt an account of the numerous researches of his long and active career; on the subject of madder, alizarine and various anthraquinone derivatives, he published more than thirty papers, and his contributions to the chemistry of the lichens, indigo, cochineal and chlorophyll have been of the highest importance. His early predilection for the study of natural products remained with him to the last, and until quite recently he was engaged upon the investigation of the colouring matter which is present in the common blackberry. The difficulty of the many subjects which he undertook and the elaborate care which he bestowed upon even the smallest operation account for the fact that he was less prolific than many of his contemporaries, but this, on the other hand, has added to the more permanent value of his researches. His dislike for slovenly or untidy work was characteristic of the man, and he frequently stated his inability to work in comfort should more than four glass vessels be upon the bench before him. Shortly after his father's death, which occurred in 1872, he erected his private laboratory at Kersal; this, which is probably the finest in the kingdom, he bequeathed to the Owens College, Manchester.

He was a Fellow of the Royal Society, for some years president of the Manchester Literary and Philosophical Society, a vice-president of the Chemical Society, and, from 1896–7, president of the Society of Chemical Industry, and in 1887, at the Manchester meeting, was president of the Chemical Section of the British Association. In 1898, he received the Dalton medal of the Manchester Literary and Philosophical Society; in 1899, the Davy medal of the Royal Society, and in 1900, the gold medal of the Society of Chemical Industry. He married, in 1851, Judith, the daughter of John Brooke, of Stockport, who survives him, and of his eight children four are now living.

A. G. P.

NOTES.

ALL who are interested in scientific progress will welcome the suggestion that the time has now fully arrived for obtaining a public portrait of Lord Rayleigh, whose work and influence have contributed greatly to the advancement of natural knowledge. The eminence of Lord Rayleigh as a scientific discoverer renders such a form of commemoration most desirable, and his public services in many capacities, including that of chairman of the board of the National Physical Laboratory, supply additional reasons. The proposition that steps should be taken to give effect to this project has already received the assent of a number of leaders in the scientific world, and Sir Andrew Noble, Sir Oliver Lodge and Prof. Arthur Schuster have consented to act as joint treasurers for this purpose. It is intended to circulate a first formal list of subscribers after the end of January. It is therefore desired that those who wish to participate will signify their intention to one of the treasurers, by name, at the address of the Royal Society. A meeting of subscribers will be called hereafter to decide upon the next steps to be taken.

THE successful inauguration of wireless telegraphic communication between the United States and England was accomplished by Mr. Marconi at the beginning of this week, which is less than a month after the first message was sent from Cape Breton, Canada, to this country. The distance from the United States station at Cape Cod to Cornwall is about 3000 miles, and is, therefore, greater than that from Cape Breton. The first message was sent from President Roosevelt to the King, and was dispatched by Mr. Marconi himself. The message read as follows:—"His Majesty King Edward VII., London. In taking advantage of the wonderful triumph of scientific research and ingenuity which has been achieved in perfecting the system of wireless telegraphy, I extend on behalf of the American people the most cordial greetings and good wishes to you and all the people of the British Empire. (Signed) THEODORE ROOSEVELT." Later in the day, His Majesty replied in the following terms:—"To the President, White House, Washington. I thank you most sincerely for the kind message which I have just received from you through Signor

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